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ON THE SPECIFIC DISTINCTION OF ERIOGONUM NUTANS AND COLLINUM

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While preparing a taxonomic revision of the *Eriogonum deflexum* Torr. complex, it became necessary to investigate the relationship of *E. nutans* Torr. & Gray to the complex. From the morphological standpoint, *E. nutans* somewhat resembles *E. parryi* A. Gray and *E. brachypodium* Torr. & Gray because of its glandular pubescence, and is similar to *E. hookeri* S. Wats. in its wide campanulate involucre and the general plant stature of the immature specimens of *E. hookeri*. However, *E. nutans* lacks the cordate base of the outer perianth segments typically found in these species, and is an octoploid rather than tetraploid like all of the members of the *E. deflexum* complex. The historical and morphological confusion, however, has been with the unrelated taxon, *E. collinum* S. Stokes ex M. E. Jones.

The type of *E. nutans* was collected by Beckwith from Mud Lake Valley, Washoe County, Nevada in 1854, and was originally described by Torrey and Gray (1855) as *E. cernuum* Nutt. var. *purpurascens*. In their revision of the genus (1870), they elevated the taxon to the species rank.

The inclusion of *E. nutans* into the California flora has been based on Watson's treatment of *Eriogonum* in *Botany of California* (1880), at which time he erroneously cited the Beckwith collection as coming from Lassen County. Jepson (1914), Abrams (1944), and Munz (1959) have all considered this species to be in California on the basis of this error. A recent review of herbarium material has revealed that *E. nutans* is not in California.

E. collinum was described in 1903 from a series of collections made by Stokes, Jones, and Hillman from the vicinity of Reno, Nevada. Until

now, four taxa described by M. Gandoger (1906) have been thought, by this writer and others, to be referable to *E. collinum*: *E. praebens* Gand., *E. praebens* var. *divaricatum* Gand., *E. reniforme* Torr. & Frem. var. *asarifolium* Gand., and *E. thurberi* Torr. var. *acutangulum* Gand. Jepson placed the California collection of *E. praebens* under the southern California and adjacent Nevada species, *E. reniforme* Torr. & Frem., without comment. Tidestrom (1925), possibly following Jepson's treatment, placed *E. praebens* under *E. reniforme*, and questionably referred *E. collinum* to that taxon. While Abrams did not handle *E. praebens* in any manner, Munz modified the problem slightly by placing the Gandoger species under *E. nutans*. When Stokes monographed the genus (1936), she referred *E. praebens* and the var. *divaricatum* to her species, but considered *E. reniforme* var. *asarifolium* as a synonym of *E. reniforme*, and made a new combination, *E. cernuum* Nutt. ssp. *acutangulum* for the last Gandoger taxon. The main reason for this assumption is that all of the Hillman specimens deposited at Reno, which bear the same location data as that given by Gandoger, are *E. collinum*, but the holotypes at Lyon, France, are not that species. *Eriogonum praebens* and var. *divaricatum* are *E. baileyi* S. Wats. var. *tomentosum* S. Wats., var. *asarifolium* is *E. pusillum* Torr. & Gray, and var. *acutangulum* is *E. maculatum* Heller. One Gandoger species not previously associated with *E. collinum* is *E. restioides*. The description was based mainly upon two plants of *E. baileyi*, but the leaf description is that of *E. collinum*, the left hand specimen on this mixed sheet.

The relationship of *E. collinum* to the other members of the Section *Pedunculata* Benth. in DC. is still obscure. The closest species to *E. collinum*, at least from a morphological and cytological standpoint, seems to be a taxon Stokes described as *E. demissum* S. Stokes. However this taxon, by our present subgeneric concept, is a member of the subgenus *Oregonium* S. Wats., rather than *Ganysma* S. Wats., and thus more work is necessary before the relationship of either taxa can be established.

During the summer of 1964, Noel H. Holmgren of the New York Botanical Garden and this writer made field observations on the two species, and obtained cytological material. Buds were collected from living specimens, and placed in Newcomer's Solution (1953). Anther smears were made using the iron-acetocarmine techniques, and counts were taken from temporary mounts of Telophase II. A tabular arrangement of the chromosome numbers and citation of specimens follows. All collections were made by N. H. Holmgren and J. L. Reveal.

E. collinum S. Stokes ex M. E. Jones. $n = 18$. Nevada, Humboldt Co., Leonard Cr., Pine Forest Range, 887; Correl Cr., Pine Forest Range, 1347; California, Lassen Co., Ravendale, 1723. Counted by J. L. Reveal.

E. nutans Torr. & Gray var. *nutans*. $n = 40$. Nevada, Humboldt Co., Quinn River Crossing, 1256. Counted by J. L. Reveal.

E. nutans var. *glabratum* Reveal. $n = 40$. Nevada, Elko Co., Deeth, 1037; Halleck, 1468. Counted by J. L. Reveal.

The results of this study are given in the following key and synopsis. To the curators of herbaria that were visited, or who have sent loan material for this study, the author is grateful.

KEY

- Peduncles curving upward, 1-3 (-5) cm long; involucre turbinate, greenish-yellow; perianth white with a yellowish cast, or yellow, strongly pustulose at the base, or rarely hirsutulous, the calyx-segments similar; achene glabrous; southwestern Idaho, northwestern Nevada, and adjacent northeastern California. *E. collinum*
- Peduncles curving downward, 3-10 mm long; involucre campanulate, reddish or ashy-gray; perianth white with a reddish cast, becoming red, or yellow, weakly pustulose or glabrous at the base, the calyx-segments dissimilar; achene pubescent; west-central Nevada through central and northern Nevada to southeastern Oregon, and central Utah. *E. nutans*
- Involucre and peduncles glandular, reddish; range of the species.
E. nutans var. *nutans*
- Involucre and peduncles glabrous, ashy-gray; Elko Co., Nevada.
E. nutans var. *glabratum*

ERIOGONUM COLLINUM S. Stokes ex M. E. Jones, Contr. West. Bot. 11:15. 1903. Type: *S. Stokes s.n.*, Reno, Washoe Co., Nevada, June 19, 1900. (UC, isotypes NY, US). *E. restioides* Gand., Bull. Soc. Bot. Belg. 42:199. 1906. Type: Reno, *Hillman s.n.* (LY), *pro parte*. *E. nutans* of Watson, Bot. Calif. 2:23. 1880; Jepson, Fl. Calif. 1:409. 1914; Abrams, Ill. Fl. Pac. States 2:34. 1944; and Munz, Calif. Fl. 343. 1959, as to the name, not as to the type. *E. reniforme* of Tidestrom, Contr. U. S. Natl. Herb. 25:154. 1925, as to synonymy in part.

Annual; scapes one to several from or slightly above the caudex, (0.5-) 1-5 (-7) dm high, trichotomous at the first node, floccose at the base becoming glabrous at maturity; leaves basal, 1-2.5 (-3) cm long, 1-3 (-3.5) cm wide, round, cordate, elliptic, to obovate, the apex rounded, the base subcordate to reniform, sparsely hirsute to densely white tomentose below, subglabrous to glabrate, or glabrous above, leaf margins plane or crenulate; petiole 1-5 cm long, tomentose, becoming sparsely floccose to glabrous at maturity; bracts (1-) 1.5-3 (-4) mm long, subulate to lanceolate, ternate and connate at the base, glabrous to hispid within and without; branches dichotomous, glabrous, rather open and divaricated, often with an involucreal-bearing peduncle in the node; peduncles curving or ascending upwards, the one or two peduncles in the upper forks occasionally straight, stoutish or slender, 1-3 (-5) cm long, glabrous; involucre turbinate (1.5-) 2-3 mm long, (1-) 1.5-2.5 mm wide, glabrous within and without, 5-lobed, the lobes acute, triangular and erect, dividing the tube $\frac{1}{3}$ to $\frac{1}{2}$ its length, bractlets white to yellowish, numerous, linear-oblongate, 1-2.5 mm long, sparsely hirsutulous with pointed marginal cells, pedicels glabrous, 2-4 mm long, 5 to 15 flowered; perianth white with a yellowish cast, to pinkish-

yellow, or yellow, the midrib pink to red-brown, pale green below the union of the outer calyx-segments, 1–2.5 mm long in anthesis, glabrous except for the pustulose or rarely hirsutulous basal portion of the perianth tube, calyx-segments similar, the lobes ovate, lanceolate to spatulate, margins of the segments often crispate, becoming somewhat revolute; stamens glabrous, included, 1–1.5 mm long, anthers greenish to yellow, or reddish; calyx-segments elongated in fruit; achene glabrous, fusiform, 2–2.5 mm long, tapering to a short 3-angled beak. $n = 18$

Distribution. In the sandy valley bottoms and clayey foothills of the Reno and Carson City area north to Humboldt Co., Nevada, and adjacent Owyhee Co., Idaho, and eastern California from Sierra Co. north to Lassen Co. Flowering from June to September.

Representative specimens. CALIFORNIA. Lassen Co.: near Secret Valley, *Kelly in 1937* (CAS); near Termo, *True 912* (CAS); Bull Flat near Honey Lake, *True 784* (CAS); between Mapes and Secret Valley, *Heller 15208* (CAS, NY, POM, US, UTC); between Shaffer Mountain and Warren Peak, *Hoover 4645* (CAS, NY, US); Viewland, *Ripley & Barneby 5758* (CAS, NY); 0.4 mi S of Ravendale, *Raven & Solbrig 13293* (CAS); $\frac{1}{4}$ mi S of road junction to Smoke Creek, along U. S. 395, *Bacigalupi & Constance 7136* (CAS); 1 mi S of Ravendale, *Cronquist & Holmgren 8478* (CAS, NY, UTC); 4 mi S of Ravendale, *N. Holmgren & Reveal 1723* (ARIZ, BRY, CAS, DS, GH, MO, NY, RENO, RM, RSA, SMU, UC, US, UT, UTC). IDAHO. Owyhee Co.: 13 mi SE of Bruneau, near Hot Creek, *Christ & Christ 16721* (NY). NEVADA. Humboldt Co.: Leonard Creek, Pine Forest Range, *N. Holmgren & Reveal 887* (ARIZ, BRY, CAS, DS, GH, KSC, MO, NY, RENO, RM, RSA, SMU, UC, US, UT, UTC); Corral Creek, Pine Forest Range, *N. Holmgren & Reveal 1347* (ARIZ, BRY, CAS, DS, GH, KSC, MO, NY, RENO, RM, RSA, SMU, UC, US, UT, UTC). Lyon Co.: 2.3 mi SE of Dayton, *Stackhouse 64* (UC). WASHOE Co.: Reno, *M. E. Jones in 1897* (US); Reno, *Heller 9711a* (CAS, RENO); Reno, *Eastwood 14775* (CAS); 2.3 mi NE of Sparks, *Raven 14286* (RSA); Peavine foothills, *J. T. Howell 38100* (CAS).

ERIOGONUM NUTANS Torr. & Gray, Proc. Am. Acad. 8:181. 1870. Annual; scapes one to several from or slightly above the caudex, 5–30 cm high, trichotomous at the first node, glabrous; leaves basal, 5–20 mm long, 5–25 mm wide, rounded to broadly reniform, the apex rounded, the base somewhat truncate, subcordate, or cordate, densely white tomentose below, floccose to glabrate above; petiole 5–25 mm long, tomentose, occasionally sheathing up the stem for as much as 1 cm; bracts 1–2 mm long, triangular, 2- or 3-parted, glandular or glabrous without, arachnoid pubescent or glabrous within; branches dichotomous, glandular or glabrous, open to diffuse, often with an involucre-bearing peduncle in the nodes; peduncles curving downward, or somewhat cernuous, slender, 3–10 mm long, glandular or glabrous; involucre campanulate, 2–3 mm long, 2–3.5 mm wide, glandular or glabrous within and without, 5-lobed, the lobes rounded, erect, dividing the tube to about $\frac{1}{2}$ its length, reddish-brown with a white membranous margin, or ashy-gray, bractlets 1–1.5 mm long, linear-oblongate, minutely hirsutulous with capitate marginal cells; pedicels glabrous or sparsely glandular at the base, 2.5–3.5

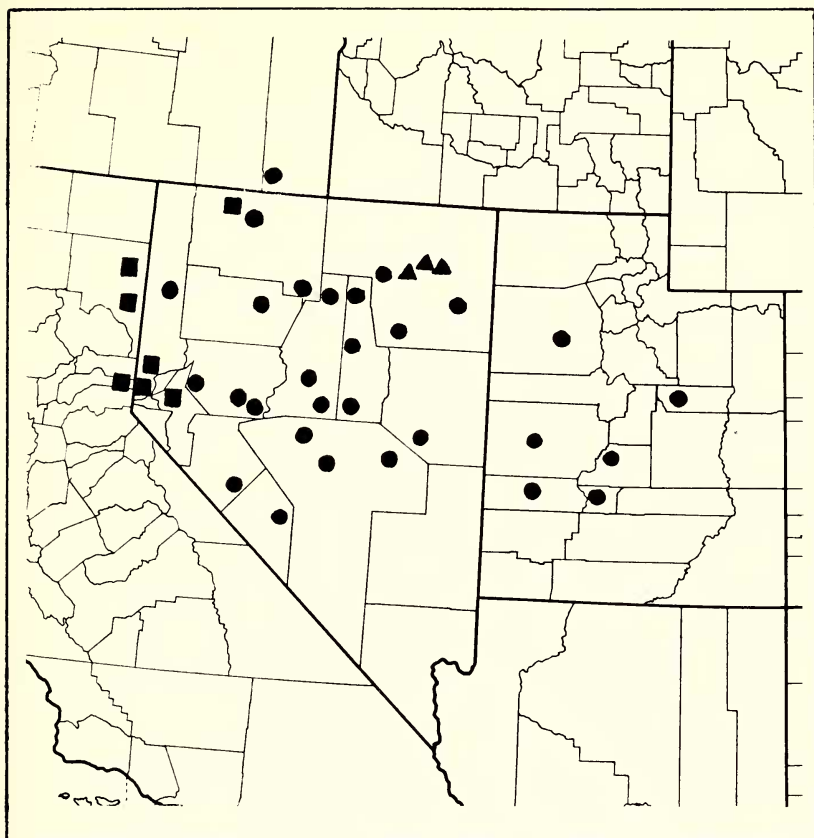


FIG. 1. Distribution of *E. collinum* (squares), *E. nutans* var. *nutans* (circles), and *E. nutans* var. *glabratum* (triangles).

mm long, 5 to 10 flowered; perianth white, rose, deep red, or yellow, 2-3 mm long in anthesis, weakly pustulose or glabrous on the basal portion of the perianth tube, calyx-segments dissimilar, the outer whorl oblong or oval, emarginate at the broad apex, obtuse at the base, the inner whorl narrower and shorter; stamens glabrous, 2-3 mm long, anthers green or red; calyx-segments elongated in fruit; achene pubescent with short appressed brownish hairs, 1.7-2 mm long, the subglobose base tapering to a long 3-angled beak. $n = 40$.

ERIOGONUM NUTANS Torr. & Gray var. **NUTANS**. Type: *Beckwith*, Mud Lake Valley, Washoe Co., Nevada, June 16, 1854, (NY, isotypes GH, photograph of this isotype at DS, UTC, additional isotype at MO). *E. cernuum* Nutt. var. *purpurascens* Torr. & Gray, Pacif. Railroad Report 2:124. 1855. *E. rubiflorum* M. E. Jones, Zoe 4:281. 1895. Type: Dugway, Tooele Co., Utah, May 28, 1891, *M. E. Jones s.n.* (POM,

isotypes, A, ARIZ, DS, MO, NY, UC, US). *E. nutans* var. *brevipedicellatum* S. Stokes, Gen. Eriog. 43. 1936. Type: 30 mi W of Eureka, Eureka Co., Nevada, August 25, 1931, *J. T. Howell* 7974 (CAS, isotype GH). *E. deflexum* Torr. in Ives ssp. *ultrum* S. Stokes, Gen. Eriog. 45. 1936. Type: Sevier Valley, Sevier Co., Utah, June 18, 1933, *Eastwood & Howell* 623 (CAS).

Peduncles and involucre glandular, reddish; plants 5–20 cm high; range of the species.

Distribution. In the sandy valley bottoms and lower foothills of western Nevada eastward through central and northern Nevada into southeastern Oregon, and central Utah (fig. 1). Flowering June to September.

Representative specimens. NEVADA without definite location: desert E of Walker Lake, *Bryan in 1859* (MO). Churchill Co.: Lahontan, *Headley 8* (RENO); Burnt Cabin Canyon, *Beach 1005* (UC); W of Eastgate, *Ripley & Barneby 5940* (CAS, NY). Elko Co.: Sprucemont, *M. E. Jones in 1896* (A, UC); Cave Creek, Ruby Valley, *Mason 4719* (UC); 6 mi NE of Elko, *Holmgren 1103* (MO, OKL, UC, UTC). Esmeralda Co.: Goldfield, *Shockley in 1881* (RENO). Eureka Co.: 12 mi from Cortez, *Goodner & Henning 963b* (RENO); 2 mi N of Beowawe, *Holmgren 1035* (OKL, UC, UTC). Humboldt Co.: W of Valmy, *Ripley & Barneby 5598* (NY); 3 mi E of Quinn River Crossing, *N. Holmgren & Reveal 1256* (ARIZ, BRY, CAS, DS, GH, KSC, MO, NY, RENO, RM, RSA, SMU, UC, US, UT, UTC). Lander Co.: Battle Mountain, *Kennedy 3084* (DS); Battle Mountain, *A. E. Hitchcock 638* (US); 10 mi E of Battle Mountain, *Eastwood & Howell 157* (CAS); Kingston Canyon, *Goodner & Henning 222* (RENO); 25 mi N of Austin, *Ripley & Barneby 6195* (CAS, NY). Mineral Co.: Candelaria, *Shockley in 1881* (GH); Candelaria, *Shockley 293* (DS, JEPS, GH, NY, UC). Nye Co.: Currant, *Bentley in 1916* (DS, MO, NY, RM, US); North Twin River, *Linsdale & Linsdale 992* (CAS); 1.3 mi N of Belmont, *N. Holmgren & Reveal 1542* (UTC). Pershing Co.: Unionville Valley, *Watson 1034* (GH, NY, US). White Pine Co.: 30 mi W of Ely, *Delameter in 1947* (DS). OREGON. Harney Co.: White Horse Ranch, *Peck 25637* (CAS, NY). UTAH. Beaver Co.: Milford, *M. E. Jones 1793* (A, CAS, DS, MO, NY, OKL, RM, UC, UTC). Carbon Co.: E of Wellington, *Ripley & Barneby 8640* (CAS, NY). Millard Co.: Tule Valley, *Maguire & Becraft 2554* (UTC). Piute Co.: Marysville, *M. E. Jones 5338ab* (US). Sevier Co.: Sevier Valley, near Glenwood, *Ripley & Barneby 4760* (CAS, NY).

ERIOGONUM NUTANS Torr. & Gray var. *glabratum* Reveal, var. nov. A var. *nutans* differt pedunculis et involucre glabris. Peduncles and involucre glabrous, ashy-gray; plant 1–3 dm high; Elko Co., Nevada. Type: 1 mi W of the Deeth turnoff, along the sandy roadside of U.S. 40, Elko Co., Nevada, June 20, and July 14, 1964, *N. H. Holmgren & J. L. Reveal 1037* (UTC, isotypes ARIZ, BRY, CAS, DS, GH, KSC, MO, NY, RENO, RM, RSA, SMU, UC, US, UT, WIS).

Distribution. Known only from the dry valley floor from Wells to Halleck, Elko Co., Nevada (fig. 1). Flowering from June to September.

Representative specimens. NEVADA. Elko Co.: Halleck, *Heller 9015* (NY, RENO, US); between Wells and Humboldt Wells, *Heller 9194* (NY, RENO, US); Deeth, *Heller 10561* (DS, NY, RENO, US); Wells, *M. E. Jones 25220* (CAS, MO, UC); 3.6 mi W of Wells, *Stahmann 8* (BRY); 3 mi W of Deeth, *Maguire et al 5833* (UTC); 2 mi W of Halleck, *N. Holmgren & Reveal 1468* (ARIZ, BRY, CAS, DS, GH, KSC, MO, NY, RENO, RM, RSA, SMU, UC, US, UT, UTC).

Most of the specimens cited above have been referred to *E. cernuum*, from which var. *glabratum* may be separated by its wide campanulate involucre, oblong non-undulated calyx-segments, and pubescent achene.

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NOTES AND NEWS

Trees of the Panhandle, Golden Gate Park, San Francisco. By ELIZABETH McCLINTOCK and VIRGINIA MOORE. Miscellaneous Paper No. 1. vi + 58 pp. California Academy of Sciences, Golden Gate Park, San Francisco 94118. 1965. \$1.00. This pamphlet describes the 50 kinds of trees to be found in the eight block-long extension or Panhandle of Golden Gate Park. Photographs of most of the trees are included and there is a map of the Panhandle showing the location of each tree. Interesting bits of horticultural, botanical, and historical information are also presented. This booklet should be in the hands of every one interested in the trees of San Francisco.